

**WHAT IS CLAIMED IS:**

1. A method of installing an optical fiber in a well, the method  
5 comprising the steps of:

conveying a first optical fiber section into the well; and  
monitoring a light transmission quality of the first optical fiber section  
while the first section is being conveyed into the well.

10 2. The method of claim 1, further comprising the steps of:  
conveying a second optical fiber section into the well prior to conveying  
the first section into the well; and  
connecting the first and second sections to each other in the well.

15 3. The method of claim 2, wherein in the monitoring step, the light  
transmission quality includes a quality of a connection made between the first  
and sections in the connecting step.

4. The method of claim 2, wherein the step of conveying the second  
20 section further comprises installing the second section in a portion of a wellbore  
of the well intersecting a zone in communication with the wellbore.

5. The method of claim 1, wherein the conveying step further comprises conveying the first section into the well attached to a first assembly, the first assembly including an anchor for securing the first assembly in the well.

5 6. The method of claim 5, wherein the anchor is a tubing hanger which engages a support shoulder in the well to secure the first assembly in the well, and wherein the conveying step further comprises monitoring the light transmission quality of the first section prior to engaging the tubing hanger with the support shoulder.

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7. The method of claim 5, wherein the conveying step further comprises extending the first section through the anchor between opposite sides of the anchor.

15 8. The method of claim 5, wherein the conveying step further comprises coupling the first section to a first optical connector on a first side of the anchor, and coupling the optical fiber first section to a second optical connector on a second side of the anchor.

20 9. The method of claim 8, wherein the conveying step further comprises connecting the first optical connector to a third optical connector on a second assembly used to convey the first section into the well; and

wherein the monitoring step further comprises monitoring the light transmission quality of the first section prior to disconnecting the first and third optical connectors.

5           10.    The method of claim 9, wherein the conveying step further comprises connecting the second optical connector to a fourth optical connector coupled to a second optical fiber section installed in the well prior to the first section conveying step; and

              wherein the monitoring step further comprises monitoring a light  
10 transmission quality through the connected second and fourth optical connectors prior to disconnecting the first and third optical connectors.

11. A method of installing an optical fiber in a well, the method comprising the steps of:

conveying a first assembly at least partially into the well with a first optical fiber section attached to the first assembly, the first assembly being conveyed on  
5 a second assembly;

monitoring a light transmission quality of the first optical fiber section during the conveying step by transmitting light through the first optical fiber section; and

then disconnecting the first and second assemblies.

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12. The method of claim 11, wherein the light transmitting step includes transmitting light between optical connectors attached to each of the first and second assemblies.

15 13. The method of claim 12, wherein the disconnecting step includes disconnecting the optical connectors.

14. The method of claim 11, further comprising the step of anchoring the first assembly in the well prior to the disconnecting step.

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15. The method of claim 14, wherein the monitoring step is performed prior to the anchoring step.

16. The method of claim 14, wherein the monitoring step is performed after the anchoring step.

5 17. The method of claim 14, wherein the anchoring step further comprises engaging a hanger of the first assembly.

18. The method of claim 17, wherein the conveying step further comprises coupling the first section to a first optical connector above the hanger.

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19. The method of claim 18, wherein the conveying step further comprises connecting the first optical connector to a second optical connector attached to the second assembly, and wherein the transmitting step further comprises transmitting light through the connected first and second optical  
15 connectors.

20. The method of claim 11, wherein the conveying step further comprises:

coupling the first section to first and second optical connectors attached to  
20 the first assembly;

connecting the first optical connector to a third optical connector attached to the second assembly; and

then connecting the second optical connector to a fourth optical connector in the well.

21. The method of claim 20, wherein the transmitting step further  
5 comprises transmitting light through the connected first and third optical connectors, and transmitting light through the connected second and fourth optical connectors.

22. The method of claim 20, further comprising the steps of coupling a  
10 second optical fiber section to the fourth optical connector, and positioning the second section in the well prior to the first section conveying step.

23. The method of claim 22, wherein the second section positioning  
step further comprises positioning the second section in a portion of the well  
15 intersecting a zone.

24. The method of claim 23, further comprising the step of measuring a  
temperature in the portion of the well intersecting the zone by transmitting light  
through the connected first and third optical connectors, through the first  
20 section, through the connected second and fourth optical connectors, and  
through the second section.

25. The method of claim 23, further comprising the step of gravel packing the portion of the well.

26. The method of claim 25, further comprising the step of monitoring  
5 a light transmission quality of the second section during the gravel packing step.

27. The method of claim 25, further comprising the step of monitoring a light transmission quality of the second section after the gravel packing step.

10 28. The method of claim 11, further comprising the step of connecting a tree to a subsea wellhead of the well after the monitoring step.

29. An optical fiber well installation system, comprising:

a first assembly;

a second assembly used to convey the first assembly at least partially into the well; and

5 an optical connector attached to each of the first and second assemblies, the optical connectors being connected in order to transmit light through the connected optical connectors between a first optical fiber section attached to the first assembly and a second optical fiber section attached to the second assembly.

10 30. The system of claim 29, wherein the first and second assemblies are releasably secured to each other, so that the first assembly is deposited in the well while the second assembly is retrieved.

15 31. The system of claim 30, wherein the optical connectors are disconnected when the first and second assemblies are released for displacement relative to each other.

32. The system of claim 30, wherein the optical connectors are disconnected when the second assembly is retrieved.

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33. The system of claim 29, further comprising a light transmission quality monitor connected to the second section.



34. The system of claim 33, wherein the monitor measures a light transmission quality of the first section.

5 35. The system of claim 33, wherein the monitor measures a light transmission quality of the first section.

36. The system of claim 33, wherein the monitor measures a light transmission quality of the connected optical connectors.

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37. The system of claim 33, wherein the light transmission quality indicates whether the optical connectors are operatively connected.

38. The system of claim 29, wherein further optical connectors are  
15 connected in the well when the first assembly is conveyed into the well by the second assembly.

39. The system of claim 38, further comprising a light transmission quality monitor connected to the second section, the monitor measuring a light  
20 transmission quality of the further optical connectors connected in the well.

40. The system of claim 39, wherein the light transmission quality indicates whether the further optical connectors are operatively connected.

41. The system of claim 29, wherein the optical connectors are  
5 positioned above an anchor on the first assembly, the anchor securing the first assembly in the well.

42. The system of claim 41, wherein the anchor is a tubing hanger.

10 43. The system of claim 41, wherein the optical connectors are positioned between the anchor and a light transmission quality monitor connected to the first section.

44. The system of claim 29, wherein the first assembly is a production  
15 tubing string and the second assembly is a work string.

45. The system of claim 44, wherein the production tubing string engages a completion string in the well, thereby connecting further optical connectors in the well.

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46. The system of claim 45, wherein a light transmission quality monitor is connected to the first section.

47. The system of claim 46, wherein the monitor measures a quality of light transmission through the optical connectors attached to the work and production tubing strings, through the first and second sections, and through the  
5 further optical connectors connected in the well.

48. The system of claim 42, wherein the completion string is gravel packed in the well.

10 49. The system of claim 48, wherein an optical transmission quality of a third optical fiber section attached to the completion string is monitored while the completion string is gravel packed in the well.

15 50. The system of claim 48, wherein an optical transmission quality of a third optical fiber section attached to the completion string is monitored after the completion string is gravel packed in the well.

51. A method of gravel packing a wellbore of a well, the method comprising the steps of:

positioning a completion assembly in the wellbore, the completion assembly including an optical fiber section;

5 gravel packing the completion assembly in the wellbore; and  
monitoring an optical transmission quality of the optical fiber section.

52. The method of claim 51, wherein the monitoring step is performed during the gravel packing step.

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53. The method of claim 51, wherein the monitoring step is performed after the gravel packing step.

54. The method of claim 51, wherein the optical fiber section is  
15 positioned within the completion assembly during the monitoring step.

55. The method of claim 54, wherein the optical fiber section is positioned within a screen of the completion assembly during the monitoring step.

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56. The method of claim 51, wherein the optical fiber section is positioned external to the completion assembly during the monitoring step.

57. The method of claim 56, wherein the optical fiber section is positioned external to a screen of the completion assembly during the monitoring step.